

6-2 Angles and Radians

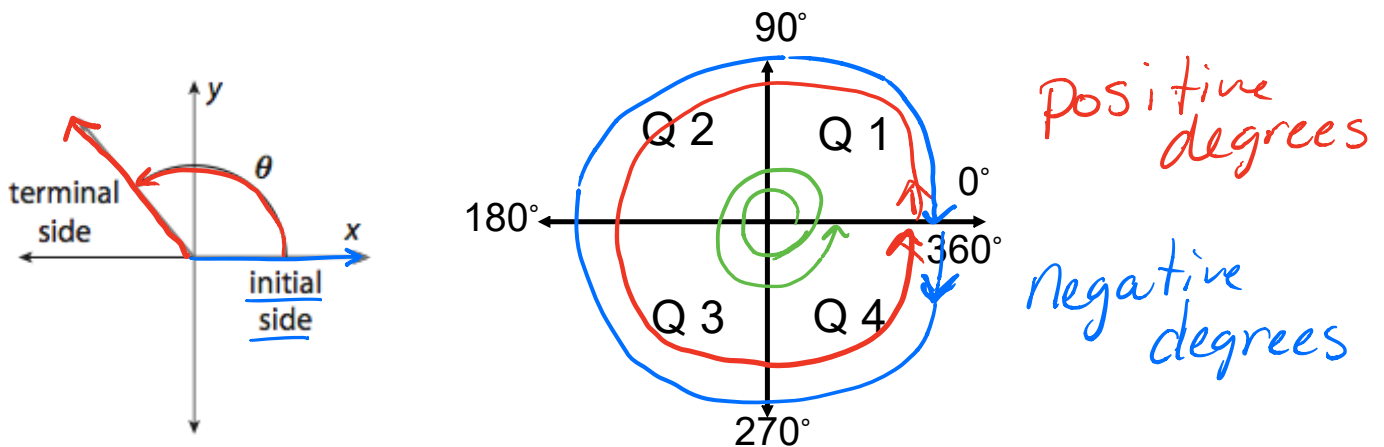
Objectives:

6-2a: I can draw angles in degrees & radians.

6-2b: I can find coterminal angles in degrees & radians.

6-2c: I can find reference angles in radians.

Initial side is the positive x-axis
Terminal side is the ray that moves from the initial side to form an angle θ with the initial side.

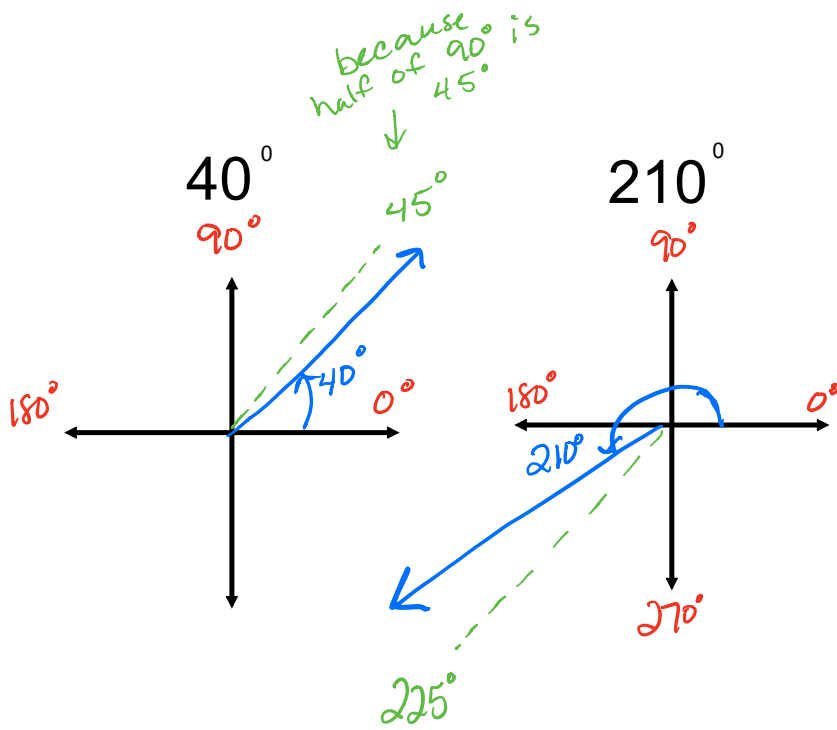


Counter Clockwise rotation: Positive degree

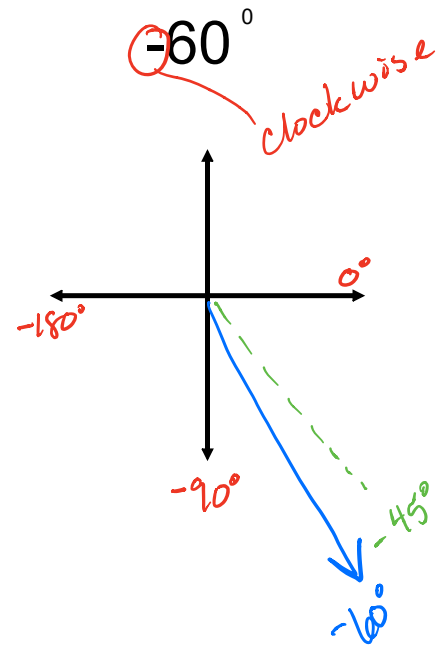
Clockwise rotation: Negative degree

Rotations may be more than 1. For example...
the green makes 2 rotations in the positive direction... therefore the angle is 720° .

Draw the following angles



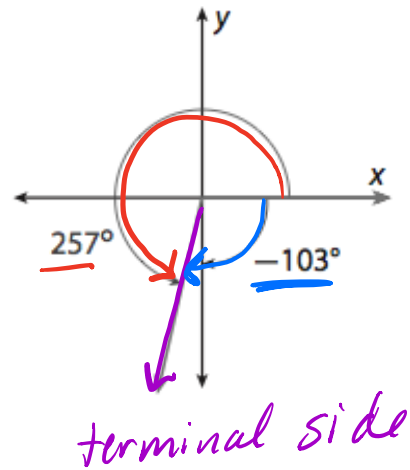
they don't have to be exact - but in the correct quadrant and in the correct area of the quadrant...



Coterminal Angles: Angles that share the same terminal side

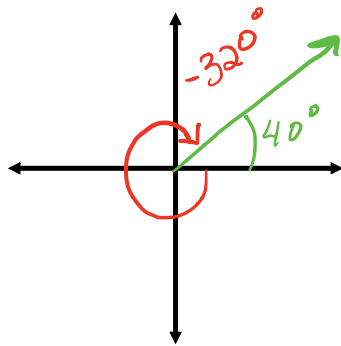
Ex. 257 and -103

To Find the terminal side...
think of another way to
get to the purple ray...
for example moving in the
negative direction 103°



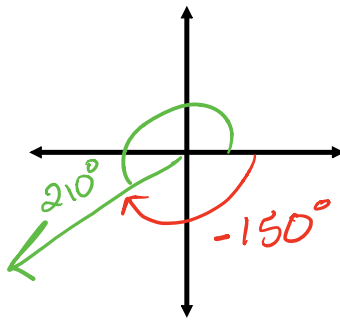
Find a co-terminal angle to each of the following

40°



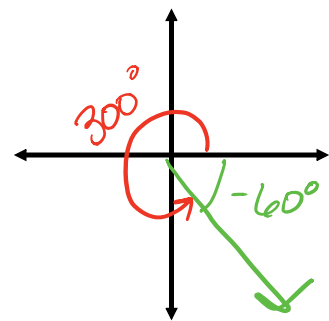
Coterminal angle
 -320°

210°



Coterminal angle is
 -150°

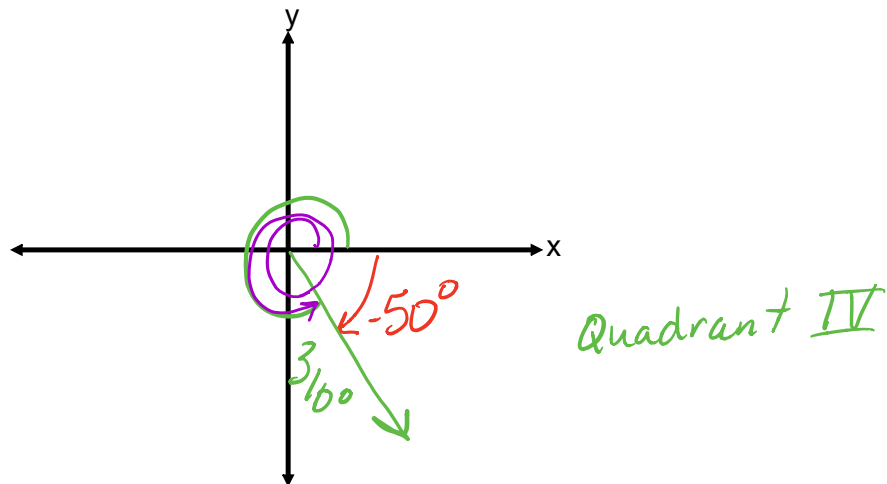
-60°



Coterminal angle is
 300°

* How do you find a coterminal angle? add or subtract 360° ... example
 $40 - 360 = -320^\circ$ $210 - 360 = -150^\circ$ $-60 + 360 = 300^\circ$

A) Draw an angle of rotation of 310° . In what quadrant is the terminal side of the angle?



On the same graph draw the following:

B) a negative coterminal angle. What is the angle measure of your angle? $310 - 360 = -50^\circ$

C) a positive coterminal angle. What is the angle measure of your angle?

$$310 + 360 = 670^\circ$$

* when asked to find a negative coterminal angle subtract 360°

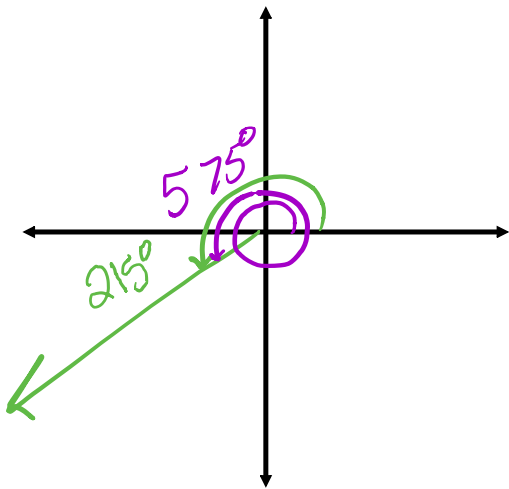
* when asked to find a positive coterminal angle add 360°

have to make more than

(You may have to make more than one rotation).

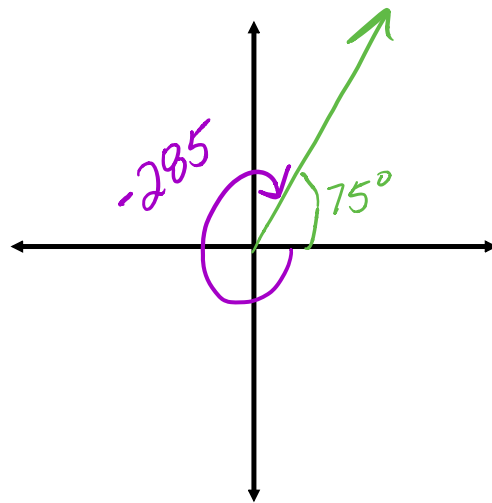
Draw and give the measure of the new angle

A positive angle coterminal to 215° .



$$215^\circ + 360^\circ = 575^\circ$$

A negative angle coterminal to 75° .



$$75 - 360 = -285^\circ$$

For each angle, find the nearest positive coterminal angle and the nearest negative coterminal angle.

$$-102^\circ$$

$$-102 + 360 = 258^\circ$$

$$-102 - 360 = -462^\circ$$

$$328^\circ$$

$$328 + 360 = 688^\circ$$

$$328 - 360 = -32^\circ$$

$$19^\circ$$

$$19 + 360 = 379^\circ$$

$$19 - 360 = -341^\circ$$

$$225^\circ$$

$$225 + 360 = 585^\circ$$

$$225 - 360 = -135^\circ$$

Let's try one more...

$$400^\circ$$

$$400 + 360 = 760^\circ$$

$$400 - 360 = 40^\circ \rightarrow \text{not a negative rotation by}$$

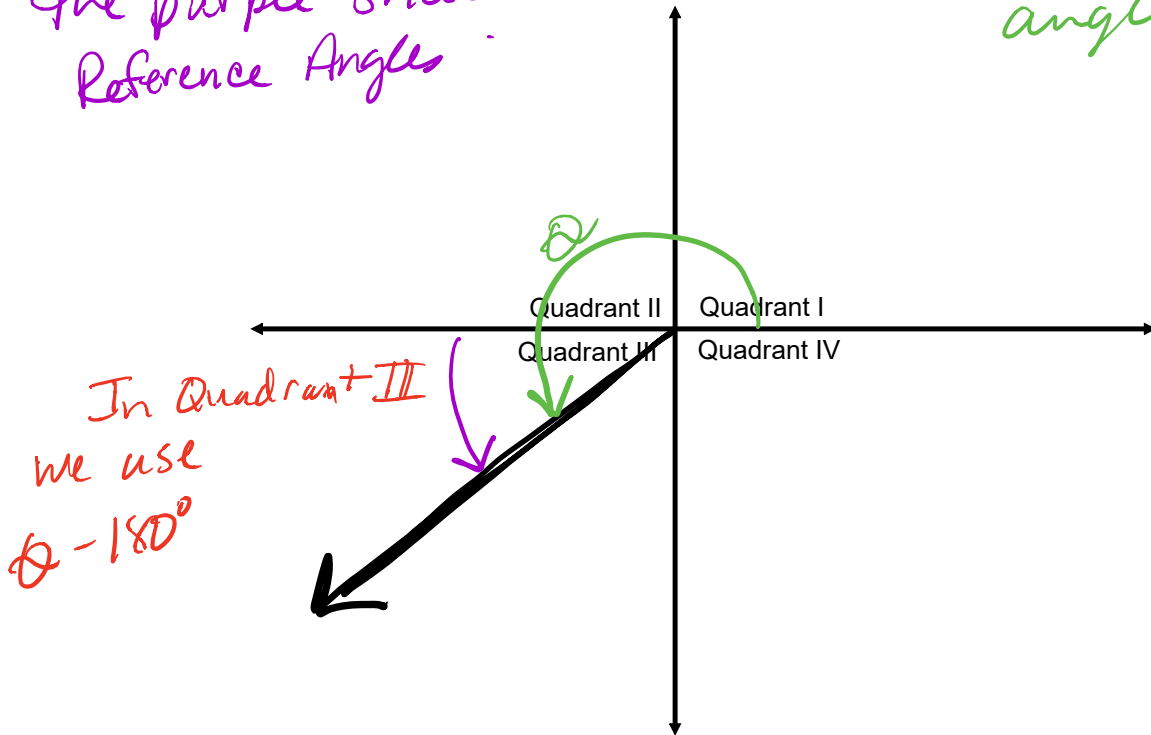
$$40 - 360 = -320^\circ$$

so let's do another subtracting another 360° .

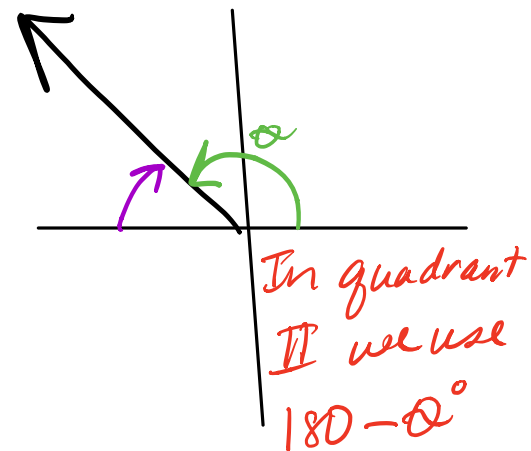
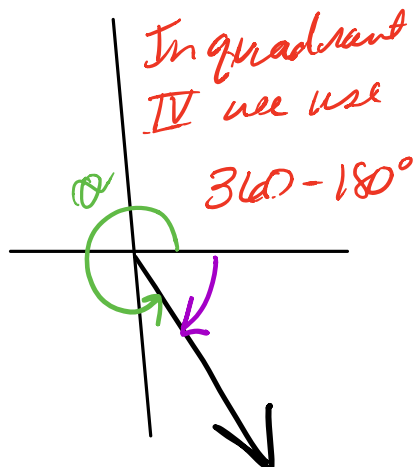
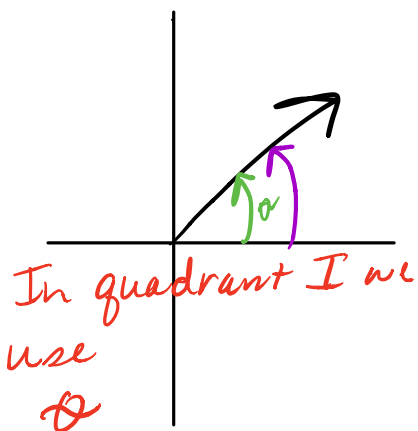
Reference Angles: The acute angle formed by the terminal side and the x-axis.

the green shows the angle.

the purple shows the Reference Angles.



In Quadrant III we use $\theta - 180^\circ$



Given the angle, find the reference angle:

First find which quadrant the angle is in

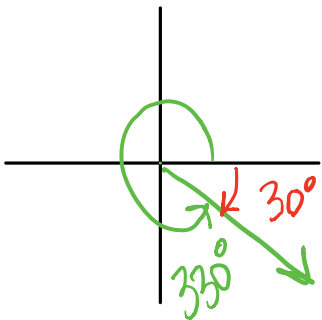
330°

Quadrant IV

We use

$$360 - 330 =$$

$$30^\circ$$

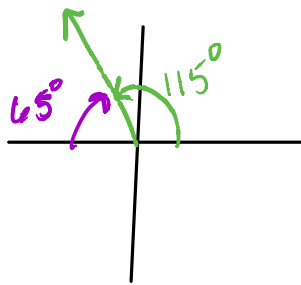


115°

Quadrant II

We use

$$180 - 115 = 65^\circ$$



460°

Quadrant II

We use

$$180 - 100 = 80^\circ$$

* Why do we use 100 and not 460?
Because one rotation is 360° and the angle is another 100°

